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ABSTRACT

A survey was conducted of teachers and administrators from schools for the deaf to analyze the poor mathematics performance of deaf and hard-of-hearing students. The insufficient training of deaf education teachers in mathematics, based on the National Council of Teachers of Mathematics (NCTM) Professional Teaching Standards and the proposed professional standards developed by the Council on Education of the Deaf, was examined. Results indicated that teachers were inadequately prepared: (1) only 25 percent of the teachers held a higher education degree in a mathematics-related field; (2) within the grade 9-12 category, just 51 percent had majored or minored in a mathematics-related field, as opposed to 81 percent of regular education mathematics instructors at this level; and (3) teachers at the grade 9-12 level reported having taken a mean number of only 7.5 mathematics-related courses. In terms of professional development, survey results noted that 60 percent of K-12 teachers had attended no school-sponsored mathematics in-service sessions within the previous year, while almost 40 percent attended no outside sessions; 65 percent belonged to no mathematics organizations; and 64 percent indicated reading no more than one mathematics publication. Recommendations are offered to better prepare teachers in mathematics, including making mathematics education a priority; having administrators take a more proactive role in increasing the competency of mathematics teachers; having deaf education teachers involved in mathematics join professional mathematics organizations, attend conferences, and read related publications; and having professional organizations focus attention on special populations. (Contains 13 references.) (CR)

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Teacher Subject Matter Competencies in Mathematics: Where Do We Go From Here?

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In this age of technology, a comprehensive mathematical knowledge and the ability to apply that knowledge is critical to virtually every profession; yet, the mathematics education of deaf and hard of hearing students has been virtually ignored. Achievement scores are consistently low, lagging behind hearing counterparts by as much as two grade-levels (Allen, 1995).

Part of the reason for this poor performance may be insufficient training of deaf education teachers. Teacher preparation programs often focus disproportionately on issues and topics related to language and communication to the exclusion of most other subject areas (Innes, 1992; Kidd, Madsen, & Lamb, 1993; Blackburn & Pagliaro, 1994). Past studies conclude that while teachers in deaf education are adequately prepared to teach deaf children, they are ill-equipped for mathematics instruction (Goodstein, 1981; Kluwin & Moores, 1985).

Since the mid-1980s, mathematics education has experienced a reform movement. In response to societal changes and demands of industry, instruction has turned more toward application and problem-solving and away from the traditional computation exercises. Likewise, modification in the preparation of mathematics teachers has been advocated.

In response, the National Council of Teachers of Mathematics (NCTM) has published three documents that lay the foundation for today's mathematics education. The second of these documents, the *Professional Standards for Teaching Mathematics* (NCTM, 1991), offers guidance to preservice and in-

service teachers, as well as to administrators for the support and development of teacher competency in mathematics and mathematics instruction.

The National Action Plan for Mathematics Education Reform for the Deaf [NAPMERD] (Dietz, 1995) reiterates these convictions. The Plan recommends that preservice and in-service programs assume responsibility for increasing the mathematics skills and knowledge of deaf education professionals in content, pedagogy, and cognition. The Convention of American Instructors of the Deaf and ACE-DHH also support subject matter competencies for deaf education teachers ("Minutes of the Meetings ," 1996). Evidence of this campaign can be seen in the "Standards and Indicators" recently distributed by the Council on Education of the Deaf (1997).

In light of the developments outlined above, the study reported here was conducted to describe the current status within deaf education of teacher preparation and professional development in mathematics, as well as the nature of support teachers receive from schools (Pagliaro, 1996). The investigation surveyed teachers and administrators from schools for the deaf throughout the nation. Data were analyzed using descriptive and correlational summaries. Professionals representing 74 percent of the schools responded. Results indicated little change from prior studies.

The data confirm that teachers of deaf and hard of hearing students, especially at the high school level, may be inadequately prepared to teach mathematics. Overall, just 25 percent of teachers reported holding a higher

education degree in a mathematics-related field. Within the 9-12 grade category, just 51 percent majored or minored in a mathematics-related field, as opposed to 81 percent of regular education mathematics instructors at this level (Weiss, Matti, & Smith, 1994). Results associated with coursework present a similar picture. Teachers at the 9-12 level reported having taken a mean number of 7.5 mathematics-related courses, almost six short of the amount recommended by the NCTM (1981).

Questions related to professional development reveal a moderate number of teachers who actively seek to expand their mathematics knowledge and instruction skills through in-service sessions, professional mathematics organizations, and mathematics publications. Sixty percent of K-12 teachers attended no school-sponsored mathematics in-service sessions within the previous year, while almost forty percent attended no "outside" sessions. Sixty-five percent belonged to no professional mathematics organizations, including almost half of the 9-12 teachers; and 64 percent indicated reading no more than one mathematics publication. Forty-six percent remained unfamiliar with the *Standards* documents, and just 7 percent reported reading the NAPMERD report.

Although aware of the need for qualified mathematics instructors, many schools offered little opportunity for professional growth. Sixty-nine percent reported having no school membership in professional mathematics organizations, and 43 percent offered no mathematics in-service sessions within

the previous year. The majority of schools (75 percent) did offer support for professional development in the form of release time, partial reimbursement of expenses, and or travel/per diem. Administrators also noted a mean number of three mathematics-related publications available to teachers. Still, less than 40 percent of schools had available any one of the *Standards* documents and only 25 percent indicated that they had the NAPMERD report.

In summary, if we are to prepare students to meet the challenges of the next millennium, attention must be given to the mathematics preparation of teachers. The following recommendations are offered:

1. The field of deaf education should make mathematics education a priority (including raising the competencies of its teachers) to prepare its students to meet the demands of living in the 21st century.
2. Administrators should take a more proactive role in increasing the competency of mathematics teachers; including demanding qualified personnel from preparation programs, encouraging and rewarding professional development, and providing on-going support through workshops, publications, and school memberships in professional mathematics organizations.
3. Deaf education professionals involved in mathematics should make a greater effort to join professional mathematics organizations, attend conferences, and read related publications. Teachers should take advantage of school offerings to support these efforts.

4. Professional organizations should focus attention on special populations and increase accessibility to membership and publications.

The author hopes that this investigation brings renewed attention to mathematics instruction within deaf education, and works to expand opportunities for deaf and hard of hearing students.

References

Allen, T. E. (1995). Demographics and national achievement levels for deaf and hard of hearing students: Implications for mathematics reform. In C. H. Dietz, Moving toward the Standards: A national action plan for mathematics education reform for the deaf (pp. 41-49).

Blackburn, L. & Pagliaro, C. M. (1994). Graduate level teacher preparation programs in deaf education: A descriptive analysis. Unpublished manuscript.

Council on Education of the Deaf. (1997). Standards and Indicators. (Available from the Association of College Educators - Deaf and Hard of Hearing).

Dietz, C. H. (1995). Moving toward the Standards: A national action plan for mathematics education reform for the deaf. Washington, DC: Pre-College Programs Gallaudet University.

Goodstein, H. (1981). Mathematics preparation and mathematics in-service training needs and preferences of mathematics teachers of the hearing impaired in the United States. Dissertation Abstracts International, 42, 4752. (University Microfilms No. 82-08,514).

Innes, J. J. (1992). B: Mathematics is for everyone: Refocusing efforts and priorities in the education of the deaf [Abstract]. In D. S. Martin & R S. Mobley (Eds.), Proceedings of the First international Symposium on Teacher Education in Deafness 1992 (pp. 256-263). Washington, DC: Gallaudet University.

Kidd, D. H., Madsen, A., & Lamb, C. (1993). Mathematics vocabulary: Performance of residential deaf students. School Science and mathematics, 93(8), 418-421.

Kluwin, T. & Moores, D. F. (1985). The effects of integration o the mathematics achievement of hearing impaired adolescents. Exceptional Children, 52, 153-160.

Minutes of the meetings at the annual conference in Williamsburg: Business meeting, Saturday, March 2, 1996. (1996, October). The Newsletter of the Association of College Educators-Deaf and Hard of Hearing, 8, 7-8.

National Council of Teachers of Mathematics. (1981). Guidelines for the preparation of teachers of mathematics. Reston, VA: Author.

National Council of Teachers of Mathematics. (1991). Professional standards for teaching mathematics. Reston, VA: Author.

Pagliaro, C. M. (1996). Mathematics reform in the education of deaf and hard of hearing students. Unpublished doctoral dissertation, Gallaudet University.

Weiss, I. R., Matti, M. C., & Smith, P. S. (1994). Report of the 1993 national survey of science and mathematics education. Chapel Hill, NC: Horizon Research, Inc.